REMARKS

The Office Action notes that claims 2-8 are pending in the application. By this amendment, claims 2 and 5 have been amended and claim 8 has been cancelled. The amendment to claims 2 and 5 are fully supported by the specification and do not add any new matter to the application. Therefore, claims 2-7 are currently pending in the application.

In the Office Action, the Examiner: (1) rejected claims 2-7 under 35 USC §112, first paragraph; (2) rejected claim 2 under 35 USC §112, second paragraph; and (3) rejected claims 2-8 under 35 USC §103(a). Applicant responds to the Examiner's rejections below.

Claim Rejections – 35 USC §112, First Paragraph

The Examiner rejected claims 2-7 under 35 USC §112, first paragraph, because the Examiner believes the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s) had possession of the claimed invention. Applicant respectfully traverses this rejection.

First, Applicant has amended claim 2 above to include all of the limitations recited in claim 8 (and cancelled claim 8), which was not rejected by the Examiner under 35 USC §112, first paragraph. Therefore, Applicant respectfully requests that this rejection be withdrawn.

Furthermore, even without the above amendment to claim 2, Applicant respectfully submits that the original specification of the current application does support the recited "current carrying region" limitations in claim 2. The specification states:

> "An object of the present invention is the development of a process for producing stoichiometric-nanostructured materials. This process comprises the steps of:
>
> - generating a plasma;
> - forming an "active volume" through introduction of an oxidizing gas into the plasma, before the plasma is expanded into a field-free zone, either (1) in a region in close proximity to a zone of charge carrier generation, or (2) in a region of current conduction between field generating elements, including the surface of the field generating elements; and

- transferring energy from the plasma to a precursor material or materials and forming in the "active volume" at least one of nanoparticles and a vapor that may be condensed to form a nanoparticle." (paragraphs [0014]-[0017])

The specification also states that to generate the plasma, "[a] free-burning electric arc is struck between anode and cathode using methods taught in U.S. Patent Nos. 3,900,762, 3,899,573, and 4,080,550." (paragraph [0020]) A free-burning electric arc between anode and cathode inherently forms an electric field with a current carrying region, or conduction column, between anode and cathode.

In addition, the terms "a current carrying region of an anodic column" and "a current carrying region of a cathodic column" are common terms that are well known to those skilled in the art. These terms refer to the current carrying region near the cathode and anode, respectively.

The specification also provides an antecedent basis for using the term arc column, stating "[i]n U.S. Pat. No. 3,209,193, the precursor material is introduced into the arc column of a free-burning plasma at the anode and U.S. Patent 3,900,762 describes a working embodiment of the volumetric introduction of precursor into a plasma arc." (paragraph [0003]) U.S. Patent 3,900,762 details the technique for efficiently energizing reactive materials in the conduction column of a free-burning electric arc. (*see* U.S. Patent 3,900,762 at col. 1, ll. 25-28) The following terms are used throughout U.S. Patent 3,900,762 and establish they are terms known to one skilled in the art: "conduction column of an arc discharge between an anode and cathode" (*Id.* at col. 2, ll. 15-16), "arc column" (*Id.* at col. 2, l. 19), "conduction column of a free-burning electric arc" (*Id.* at col. 2, ll. 32-33), etc.

The specification also states that heterogeneous precursor feed is "injected into the cathodic arc column." (see paragraphs [0028] and [0035]) The "cathodic arc column" is inherently the same as "a current carrying region of a cathodic column."

Furthermore, a free-burning arc between anode and cathode is an electrical discharge between anode and cathode and inherently is a current carrying region, also known as a conduction column, also known as an arc column. In the context of a free-burning arc between anode and cathode "a current carrying region" is equated to a "region of current conduction" – this is a DC circuit.

Claim Rejections – 35 USC §112, Second Paragraph

The Examiner rejected claim 2 under 35 USC §112, second paragraph, because the Examiner believes the recitation of "the nanostructured material" lacks antecedent basis. Applicant respectfully submits that the above amendment to claim 2 overcomes this rejection and respectfully requests that this rejection be withdrawn.

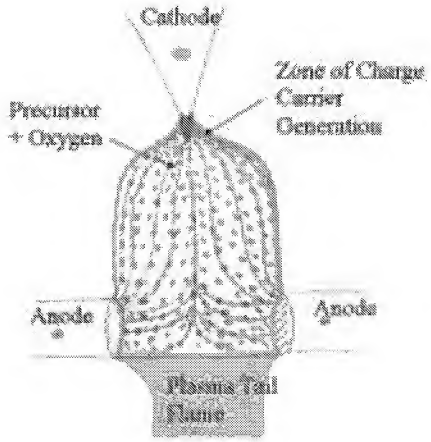
Claim Rejections - 35 USC §103(a)

The Examiner rejected claims 2, 3, 5, 6, and 8 under 35 USC §103(a) as being unpatentable over US Patent 3,989,512 ("Sayce") in view of US Patent 5,788,738 ("Pirzada"). Applicant respectfully traverses this rejection.

As to independent claim 2, neither Sayce nor Pirzada disclose or suggest: (1) "introducing an oxidizing gas into the plasma before the plasma is expanded into a field free zone"; (2) "injecting a precursor material into the plasma in the area of the plasma before the plasma is expanded into a field free zone"; or (3) "forming at least one of a stoichiometric-nanostructured material and a vapor that may be condensed to form a stoichiometric-nanostructured material in the area of the plasma before the plasma is expanded into a field free zone" as recited in claim 2 as amended.

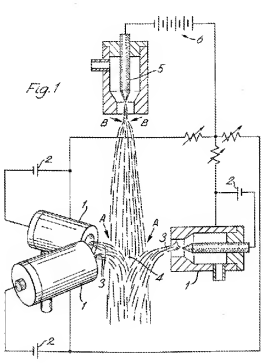
First, neither Sayce nor Pirzada disclose or suggest "introducing an oxidizing gas into the plasma before the plasma is expanded into a field free zone" as recited in claim 2, as amended.

As can be seen in the illustration below, the area of the plasma located between the Cathode and the Anode (highlighted in green) is the area of the plasma before the plasma is expanded into a field free zone. In claim 2, this is the area where the oxidizing gas and the precursor materials are introduced and the stoiciometric-nanostructured material and/or vapor are formed. Once the plasma passes the Anode, it expands into a free field zone. The area of the plasma after the plasma passes the Anode (highlighted in yellow and labeled "Plasma Tail Flame") in the illustration below is the area of the plasma after the plasma expands into a field free zone.



As for Sayce, the gas used to form the plasma (the only gas introduced into the plasma before the plasma is expanded into a field free zone) is an inert gas, not an oxidizing gas. In fact, Sayce specifically teaches away from using an oxidizing gas to form the plasma because use of

an oxidizing gas would cause degradation and deterioration of the cathode 5. The only areas in Sayce where an oxidizing gas may be introduced are in regions A and B of Fig. 1. (*see* Sayce, col. 5, ll. 16-19, and Fig. 1 (reproduced below)).



Sayce, Fig. 1

However, both of these areas are in the plasma jet, which is after the plasma has expanded into a field free zone. When compared to the illustration above, region B in Sayce is in the "Plasma Tail Flame," which is after the plasma expands into a field free zone. As for Pirzada, there is no disclosure in Pirzada of introducing an oxidizing gas into the plasma at all.

Second, neither Sayce nor Pirzada disclose or suggest "injecting a precursor material into the plasma in the area of the plasma before the plasma is expanded into a field free zone" as recited in claim 2, as amended. As for Sayce, the precursor material is introduced in regions A and B of Fig. 1, both of which are in the plasma jet, which is after the plasma has expanded into a field free zone. As for Pirzada, there is no disclosure of injecting a precursor material into the

plasma at all. As Applicant stated previously, in Pirzada, the plasma is used to heat the thermal reactor chamber that the precursor material passes through, however, the precursor material is never injected into the plasma. In the current Office Action, the Examiner did not challenge, traverse, or in any way address or comment on this argument by Applicant. Applicant therefore takes this failure of the Examiner to respond to this argument as an admission by the Examiner that this argument is correct.

Third, neither Sayce nor Pirzada disclose or suggest "forming at least one of a stoichiometric-nanostructured material and a vapor that may be condensed to form a stoichiometric-nanostructured material in the area of the plasma before the plasma is expanded into a field free zone" as recited in claim 2, as amended. As for Sayce, as discussed above, the precursor material in introduced after the plasma is expanded into a field free zone. Therefore, any material formed would be formed in the area of the plasma after the plasma is expanded into a field free zone. As for Pirzada, as discussed above, nanostructured materials are not formed in the plasma at all. The plasma is only used heat the thermal reactor chamber.

Therefore, even if such a combination as Sayce and Pirzada were made, which Applicant does not concede is proper, the purported combination still would not reflect all of the elements recited in claim 2. Claims 3, 5, and 6 (claim 8 has been cancelled) depend from independent claim 2 and for the reasons stated above are also patentable over Sayce in view of Pirzada.

The Examiner also rejected claims 4 and 7 under 35 USC §103(a) as being unpatentable over Sayce in view of Pirzada and further in view of Applicant's admission. Applicant respectfully traverses this rejection.

Claims 4 and 7 depend from independent claim 2. As discussed above for independent claim 2, neither Sayce nor Pirzada disclose or suggest: (1) "introducing an oxidizing gas into the

plasma before the plasma is expanded into a field free zone"; (2) "injecting a precursor material into the plasma in the area of the plasma before the plasma is expanded into a field free zone"; or (3) "forming at least one of a stoichiometric-nanostructured material and a vapor that may be condensed to form a stoichiometric-nanostructured material in the area of the plasma before the plasma is expanded into a field free zone" as recited in claim 2, as amended. In addition, the "Applicant's admission" referred to by the Examiner also does not disclose or suggest these limitations.

Therefore, even if such a combination as Sayce, Pirzada, and Applicant's admission were made, which Applicant does not concede is proper, the purported combination still would not reflect all of the elements recited in claims 4 and 7.

The Examiner also rejected claims 2, 3, 5, 6, and 8 under 35 USC §103(a) as being unpatentable over Sayce in view of Pirzada and further in view of U.S. Patent 3,644,781 ("Sheer"). Applicant respectfully traverses this rejection.

As to independent claim 2, neither Sayce, Pirzada, nor Sheer disclose or suggest, "introducing an oxidizing gas into the plasma before the plasma is expanded into a field free zone" as recited in claim 2 as amended.

As discussed above, in Sayce, the gas used to form the plasma (the only gas introduced into the plasma before the plasma is expanded into a field free zone) is an inert gas, not an oxidizing gas. In fact, Sayce specifically teaches away from using an oxidizing gas to form the plasma because use of an oxidizing gas would cause degradation and deterioration of the cathode 5. In addition, in Pirzada, there is no disclosure in Pirzada of introducing an oxidizing gas into the plasma at all.

As for Sheer, similar to Sayce, the gas used in Sheer to form the plasma (the only gas introduced into the plasma before the plasma is expanded into a field free zone) is an inert gas, not an oxidizing gas. In fact, Sheer specifically teaches away from using an oxidizing gas to form the plasma because use of an oxidizing gas would cause degradation and deterioration of the cathode 1 and/or anode 9.

Therefore, even if such a combination as Sayce, Pirzada, and Sheer were made, which Applicant does not concede is proper, the purported combination still would not reflect all of the elements recited in claim 2. Claims 3, 5, and 6 (claim 8 has been cancelled) depend from independent claim 2 and for the reasons stated above are also patentable over Sayce in view of Pirzada and further in view of Sheer.

The Examiner also rejected claims 4 and 7 under 35 USC §103(a) as being unpatentable over Sayce in view of Pirzada and Sheer and further in view of Applicant's admission. Applicant respectfully traverses this rejection.

Claims 4 and 7 depend from independent claim 2. As discussed above for independent claim 2, neither Sayce, Pirzada, nor Sheer disclose or suggest, "introducing an oxidizing gas into the plasma before the plasma is expanded into a field free zone" as recited in claim 2, as amended. In addition, the "Applicant's admission" referred to by the Examiner also does not disclose or suggest this limitation.

Therefore, even if such a combination as Sayce, Pirzada, Sheer, and Applicant's admission were made, which Applicant does not concede is proper, the purported combination still would not reflect all of the elements recited in claims 4 and 7.

Conclusion

In view of the aforesaid, Applicant respectfully submits that claims 2-7 are in condition for allowance and a Notice of Allowance for these claims is respectfully requested.

Respectfully submitted,

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